# A CONTRIBUTION TO THE TAXONOMY OF TANYTARSINI (DIPTERA: CHIRONOMIDAE) OF SUB-SAHARAN AFRICA, WITH A DESCRIPTION OF A NEW GENUS (*AFROZAVRELIA*) AND FIVE NEW SPECIES FROM OTHER GENERA

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## ABSTRACT

A brief overview is given of existing knowledge of the systematics of Tanytarsini in sub-Saharan Africa. A new genus, *Afrozavrelia*, is established for *Zavrelia kribiensis* Kieffer and five new species (*Rheotanytarsus shebeleusis, Tanytarsus awasheusis, Tanytarsus flumineus, Tanytarsus zimbabwensis* and *Virgatanytarsus aboensis)* are also described. An additional note, on the diagnostic features of the larvae and pupae of two other species (*Rheotanytarsus fuscus* Freeman and *Rheotanytarsus montanus* Lehmann) and the pupa of *Rheotanytarsus guineensis* Kieffer, is also provided.

**Key words**: Chironomidae, Tanytarsini, Ethiopia, Zimbabwe, South Africa, new genus, new species, Diptera, systematics.

## INTRODUCTION

There are a number of reliable publications on the systematics of the tribe Tanytarsini (Diptera, Chironomidae) in Africa south of the Sahara: Freeman (1958) described new species and revised the work of earlier taxonomists, Kieffer and Goetghebuer. Kyerematen & Sæther (2000) reviewed the Afrotropical *Rheotanytarsus,* and Ekrem (2001) reviewed the Afrotropical *Tanytarsus*. All these authors included useful keys in their publications.

This does not exclude the likelihood that there are not more Tanytarsini to be described from the region, especially those of the mountain chain that extends from South Africa to Ethiopia in the north (see Ekrem 2001). This paper describes five new species from this mountain chain or its foothills and also sets up a new genus, *Afrozavrelia*, for *Zavrelia kribiensis* Kieffer, a species that does not fit into the genus *Zavrelia* Kieffer in any life stage.

The descriptions of taxa in this paper are based on studies of museum collections, from specimens collected from Ethiopia, Zimbabwe, and South Africa (see 'Methods' for further details).

### THE TANYTARSINI IN SUB-SAHARAN AFRICA

The 64 sub-Saharan Tanytarsini previously described by various authors can divided into two categories: 62 species in recognized or newly-described genera, and two species that cannot be placed in known genera. These are discussed below, together with references to source publications and short notes on the diagnostic features of some species.

*Species in recognized or newly-described genera*

*Tanytarsus*: 26 species (Ekrem 2001).

*Rheotanytarsus*: 19 species (Kyerematen & Sæther 2000).

*Cladotanytarsus*: 10 species. One species (*C. crebus)* described by Lehmann (1981); six species described by Freeman & Cranston (1980); three species–*C. irsacus, 'Tanytarsus' bukavus* and *'Tanytarsus' congolensis* – described by Lehmann (1979). (*Note:* Ekrem (1999) transferred *T. bukavus* and *T. congolensis* to *Cladotanytarsus.*)

*Nidmurbia*: one species, *N. capicola,* described by Säwedal (1982). This was originally placed in *Micropsectra* by Freeman (1958).

*Stempellina.* Two species: *S. chambiensis* Goetghebuer in Freeman (1958); *S. reissi* described by Lehmann (1981).

*Stempellinella*: one species. Although Freeman (1958) described *'S. truncata'* as a species of *Stempellina,* this species fits more closely into the genus *Stempellinella* Brundin as it has a number of features more characteristic of the latter genus: in the adult male the anal point has longitudinal crests extending onto the anal tergite with basal spinules between; the pupa has a shagreen pattern similar to that of *Stempellinella brevis* (Edwards) (Pinder & Reiss 1986) and segment VIII has a single, robust sclerotized postlateral spine; the larval antenna is, however, of the *Constempellina*-type with both Lauterborn organs being distal on segment 3 and a pedestal with a prominent apical spur. (This description based on pupa, a pharate male and larval head capsule from the same sand grain case, Cat. ABLLR 9J, in AM).

*Friederia villosa* Sæther & Andersen (Sæther & Andersen 1998).

*Virgatanytarsus* – three species; *V. ardnennensis* (Goetghebeur) (= *subreflexens* Freeman), *V. nigricornis* (Goetghebeur) (see Freeman 1958) and *V. aboensis,* described in this paper.

*Zavrelia kribiensis* Kieffer (=*Afrozavrelia* sp.): one

species. In this paper this species is placed in a new genus, *Afrozavrelia.*

*Species that cannot be placed in known genera*

*'Tanytarsus' abnormis*' (Lehrmann, 1981)
Characteristic features: hairy eyes with no dorsal extension, superior volsella with digitus but no median volsella.

*'Tanytarsus' saetosus* (Lehrmann, 1981)
Characteristic features: hairy eyes with no dorsal extension; costa ending well proximal to $M_{3+4}$; anal point bare with a small knob-shaped 'point', but superior volsella and median volsella of *Tanytarsus*-type.

## METHODS

Ethiopian specimens were collected by the author while working in the cooperative programme described in the Acknowledgements. The Zimbabwean material was collected by the author working in the Zoology Department, University of Zimbabwe (then Rhodesia) financed by the Rockefeller Foundation of New York. Specimens from the Western Cape Province were collected by the author or by members of the Freshwater Research Unit, Zoology Department, University of Cape Town; the rest of the South African material was collected by Dr F. C. de Moor and his team at the Albany Museum, Grahamstown, Eastern Cape.

Pinned specimens were treated as follows: the wings were removed from the dried specimen and mounted directly in Canada balsam, then the rest of the specimen was macerated in 5% potassium hydroxide at room temperature for 24 hours; the KOH was removed by placing it in 70% alcohol for about 10 minutes, and then into 96% alcohol. It was then dissected and mounted in Canada balsam–dissolved in cellosolve–on the same slide as the wings. Specimens preserved in alcohol were dissected and mounted in the same type of balsam. Drawings were made by means of a drawing tube on a compound microscope. Measurements were made with an eyepiece micrometer in the compound microscope. Morphological terminology is according to Sæther (1980) and the description of the males follows the style of Cranston, Dillon, Pinder & Reiss (1989), using their generic definitions. The descriptions of females follows the style of Sæther (1977).

The holotypes and paratypes of all the species described here and other material used in the descriptions have been deposited in the Zoologische Staatssammlung, Munich, Germany (ZSM) or in the Albany Museum, Grahamstown, 6140, Eastern Cape Province, South Africa (AM). The catalogue numbers of the specimens are given in the text.

*Abbreviations*

AR antennal ratio. Ratio of length of apical flagellomere to combined length of basal flagellomeres.
LR leg ratio. Ratio of length of tarsomere 1 to length of tibia.
SV 'Schenkel-Schiene Verhältnis': Ratio of femur plus tibia to tarsomere 1.
BV 'Beinverhältnisse'. Combined length of femur, tibia and tarsomere 1 divided by length of tarsomeres 2 to 5.
ADH A D Harrison (Collector).

## TAXONOMIC DESCRIPTIONS

### *Afrozavrelia* gen. nov.

### Generic diagnosis

ADULT MALE
*Size:* small, wing length about 1 mm.
*Head*: antenna with 10 flagellomeres; no frontal tubercles; eyes hairy with long dorso-medial extensions; palps normal, segment 3 with no subapical sensilla.
*Thorax:* with antepronotal lobes widely separated overreaching pronotum, no tubercle; acrostichals 22, biserial, dorsocentrals 18, partly biserial, prealars 2, supra-alar 1, scutellars uniserial. Wings densely clothed with setae, costa not produced, $R_{4+5}$ ending before tip of $M_{3+4}$. Anal lobe not developed, squama bare.
Legs: fore tibia with short, straight spur, other tibia with small combs well separated each with a thin spur. Pulvilli absent.
*Hypopygium*: anal tergite bands weak not meeting centrally, about 12 anal tergite setae, anal point long, bare with rounded tip, superior volsella long with broad digitus, median volsella with few lamelliform setae and no simple setae, inferior volsella long extending up to, or beyond tip of gonostylus which is narrow with two long setae at tip.

ADULT FEMALE
(based on one pharate specimen)
*Size*: similar to male.
*Head*: general structure similar to male; antenna with five flagellomeres.
*Thorax*: similar to male. Wings and legs appear to be similar to male.
*Genitalia*: sternite VIII not forming a distinct floor under the anterior part of the vagina; gonocoxapodemes narrow and joined, gonopophysis of VIII simple, gonocoxite IX small with two setae, coxosternapodemes very small and curved; segment X without setae, postgenital plate pointed, cerci small; seminal capsules oval with short necks, ducts convoluted joining to a central bulb with common opening.

PUPA

*Size:* small, in straight cases composed mainly of diatom frustules and detritus.

*Cephalothorax*: cephalic tubercles low and rounded, frontal setae flat, almost taeniate, no antepronotals or dorsocentrals, thoracic horn long, pointed and down-turned, no spinules, minutely rugulose, three precorneal setae small, short and flattened.

*Abdomen*: tergites I and II bare, II with a short hook row, III to VI with paired, elongate patches of points, simple S setae on segments II to IV, taeniate S setae on V to VIII; segment VIII with a few small spines at posterolateral corner; anal lobes with moderately developed fringe of taeniate setae; no pedes spurii.

LARVA

*Size*: small, in straight, portable cases consisting mainly of diatom frustules and detritus.

*Head*: with five-segmented antennae, of about 86% of head capsule length, on prominent pedestal, AR about 0.6, long basal segment with ring organ near base and seta subterminally, blade shorter that segment 2, accessory blade present, Lauterborn organs large, terminal on segment 2, sessile, style present. Labrum with SI palmate, bases fused, SII plumose on tall pedestal, SIII and IV seta-like, labral lamella well-developed, pecten epipharyngis consisting of three separate, slender distally pointed scales; premandible with two teeth and well-formed brush; mandible with dorsal tooth with three inner teeth, seta sub-dentalis long and curved, seta interna small and plumose, pecten mandibularis consisting of about 10 long lamellae. Mentum with median tooth rounded, six lateral teeth, the second being shorter then the first and third; ventromental plates fan-shaped, widely separated.

*Body*: anterior and posterior parapods with simple hooks, procercus with long anal and lateral setae.

NOTES

*Afrozavrelia* can be distinguished from *Neozavrelia* and *Zavrelia* in all life stages (Table 1). In some particulars – such as the anal point structure, the presence of a digitus, and the terminal Lauterborn organs – the former genus resembles *Neozavrelia*. In other particulars – such as the hairy eyes, the antennal tergite bands not meeting, and the more complete anal fringe of the pupa – it resembles *Zavrelia*. Nevertheless, in many other particulars – such as the strong dorsal extension of the eye, the very narrow gonostylus, the lack of a floor to the anterior vagina, the taeniate frontal setae of the pupa, the long antennae of the larva (especially

**Table 1**: Morphology of *Afrozavrelia* contrasted with that of *Neozavrelia* and *Zavrelia*

| | *Afrozavrelia* | *Neozavrelia* **Goetghebuer** | *Zavrelia* **Kieffer** |
|---|---|---|---|
| MALE | Eyes hairy with long dorso-medial extension | Eyes bare or with short pubescence, no dorsomedial extension | Eyes hairy, no dorsomedial extension |
| | Front tubercles absent | Front tubercles absent | Small frontal tubercles |
| | Anal tergite bands weak, not meeting | Anal tergite bands fused, forming V-shape | Anal tergite bands not meeting |
| | Anal point bare dorsally | Anal point bare dorsally | Anal point with crests and spinules |
| | Digitus present | Digitus present | No digitus |
| | Median volsella with very few lamelliform setae | Median volsella with numerous setae, some slender | Median volsella with numerous setae, some simple |
| | Gonostylus very narrow | Gonostylus broad | Gonostylus broad |
| FEMALE | No floor under anterior vagina | Floor under anterior vagina (Cranston 1998) | Floor under anterior vagina |
| PUPA | Frontal setae taeniate | Frontal setae normal | Frontal setae normal |
| | Thoracic horn without spines or apical teeth | Thoracic horn without spines, with or without apical teeth | Thoracic horn with spines |
| | Posteriolateral comb weak, of a few small light teeth | Posterolateral comb strong, of numerous dark teeth | Posterolateral comb with single or double dark teeth |
| | Anal lobe with fringe of about 22 taeniae | Anal lobe fringe of 5-14 taeniae, or reduced | Anal lobe with fringe of 17-20 taeniae |
| LARVA | Antenna long, 86% length of head capsule, basal segment longer than flagellum | Antenna short, basal segment about as long as flagellum | Antenna short, basal segment about as long as the flagellum |
| | Lauterborn organs terminal and sessile | Lauterborn organs terminal and on pedicels | One Lauterborn organ sub-terminal, both on pedicels |

the basal segment), and the short antennal blade – it resembles neither of the above two genera.

Sæther & Andersen (1998) describe another African member of the subtribe Zavreliina (that was erected by Sæther (1977)): *Friederia villosa* Sæther & Anderson, from Ghana. The genus *Friederia* differs very markedly from *Afrozavrelia*, however, as it has bare eyes, an anal point with setal tufts, superior volsella with no digitus, and median volsella reduced to a small tubercle with one, simple seta. The female and immatures are unknown.

*Type species*
*Zavrelia kribiensis* Kieffer.

### ***Afrozavrelia kribiensis*** (Kieffer)
(Figs 1-13)

*Zavrelia kribiensis* Kieffer, 1923

Also described in Freeman (1958) and Freeman & Cranston (1980).

The description of the male, given above (in the generic diagnosis) and below, is more detailed than that of Freeman (1958) and the female, pupa and larva are also described. The female and immatures were associated from pupal cases with pharate males and females.

ADULT MALE (N = 4 mounted)
*Body*: length 1.1 mm.
*Wing*: length 0.9 mm; body colour very light brown, halteres dark tipped.
*Head* (Fig. 1): No frontal tubercles; antenna AR 0.6, 10 flagellomeres, eyes hairy with long dorsomedial extensions. Head setation: six inner verticals, two outer verticals, 30 clypeals. Length of palp segments, 15, 21, 24, 60, 111 µm; no subapical sensillae on segment 3.
*Thorax*. Setation: lateral antepronotals nil, acrostichals 22 biserial, dorsocentrals 18 biserial anteriorly, posterior prealars 2, supra-alar 1, scutellars 4 per side.
*Wings* (Fig. 2): broad, anal lobe not developed; densely clothed in setae; squama bare; $R_{4+5}$ ending before tip of $M_{3+4}$, costa not extended.
*Legs:* fore tibia with short, straight spur, other tibia with small combs, well separated each with a thin spur; LR fore 1.5, mid 0.6, hind 0.7; SV fore 1.7, BV fore 2.5.
*Hypopygium* (Figs 3 & 4): anal tergite bands weak and not meeting, about 12 anal tergite setae, anal point long, bare with rounded tip, superior volsella long with broad digitus, median volsella (Fig. 4) with one, or possibly two, lamelliform setae, no simple setae, inferior volsella longer than the combined length of the gonocoxite and gonostylus; gonostylus narrow with two long setae at the tip.

ADULT FEMALE
(based on a pharate specimen, mounted).
*Body*: length 1.6 mm
*Head:* general structures as male, antenna with five flagellomeres.
*Thorax*. Setation: acrostichals 22 biserial, dorsocentrals 14, posterior prealars 2, supra-alar 1, scutellars 5 per side. Wings and legs appear to be similar to those of the male.
*Genitalia* (Figs 5 & 6): sternite VIII not forming a distinct floor under the anterior part of the vagina, gonocoxapodemes narrow, light, joined; gonopophysis simple but with ventrolateral enlargement; gonocoxite IX small with two setae; coxosternapodemes very small, light, curved; segment X without setae; postgenital plate pointed; cerci small, 27 µm; seminal capsules (Fig. 6) oval with short necks, 42 µm long, with neck; ducts convoluted joining to a central bulb and with a common opening.

PUPA (N = 5 mounted)
Remain in larval cases, made mainly of diatom frustules and detritus.
*Exuviae*: almost colourless, transparent.
*Cephalothorax:* cephalic tubercle low and rounded, frontal setae flat, almost taeniate; dorsum minutely pebbled; no antepronotals or dorsocentral setae; thoracic horn (Fig. 7) long, pointed and downturned, no spinules, minutely rugulose; precorneal setae small, short and flattened; wing sheath with nose.
Abdomen (Fig. 8): tergites I and II bare, II with short hook row of small rounded "hooks"; tergites III-VI with paired elongate patches of points; S setae (simple)– I none, II one, III and IV three; S setae (taeniate)–V, VI, VII four, VIII five; segment VIII with a few small spines at posterolateral corner (Fig. 8); no pedes spurii. Anal lobes moderately well developed with a complete fringe of about 22 taeniate setae per side.

LARVA
(N = 1 complete specimen, mounted; also based on five larval exuviae in pupal cases.)
The larva lives in a straight, portable case made mainly of diatom frustules and detritus.
*Colour*: yellowish.
*Head*: capsule 168 µm long, dorsal surface smooth. Antenna (Fig. 9) 144 µm long, with five segments on pedestal 84 µm high with a prominent apical spur. AR 0.6. Long basal segment with ring organ near base and seta subterminally, blade shorter than segment 2, accessory blade half the length of blade, both Lauterborn organs terminal, sessile almost as long as segment 3, style present, segment five fine and pointed.
Labrum (Fig. 10): SI palmate, bases fused, SII

plumose situated on tall pedestal, SIII and SIV seta-like; labral lamella well-developed; pecten epipharyngis consisting of three separate, slender, distally-pointed scales. Premandible (Fig. 11) with two teeth and well-formed brush.

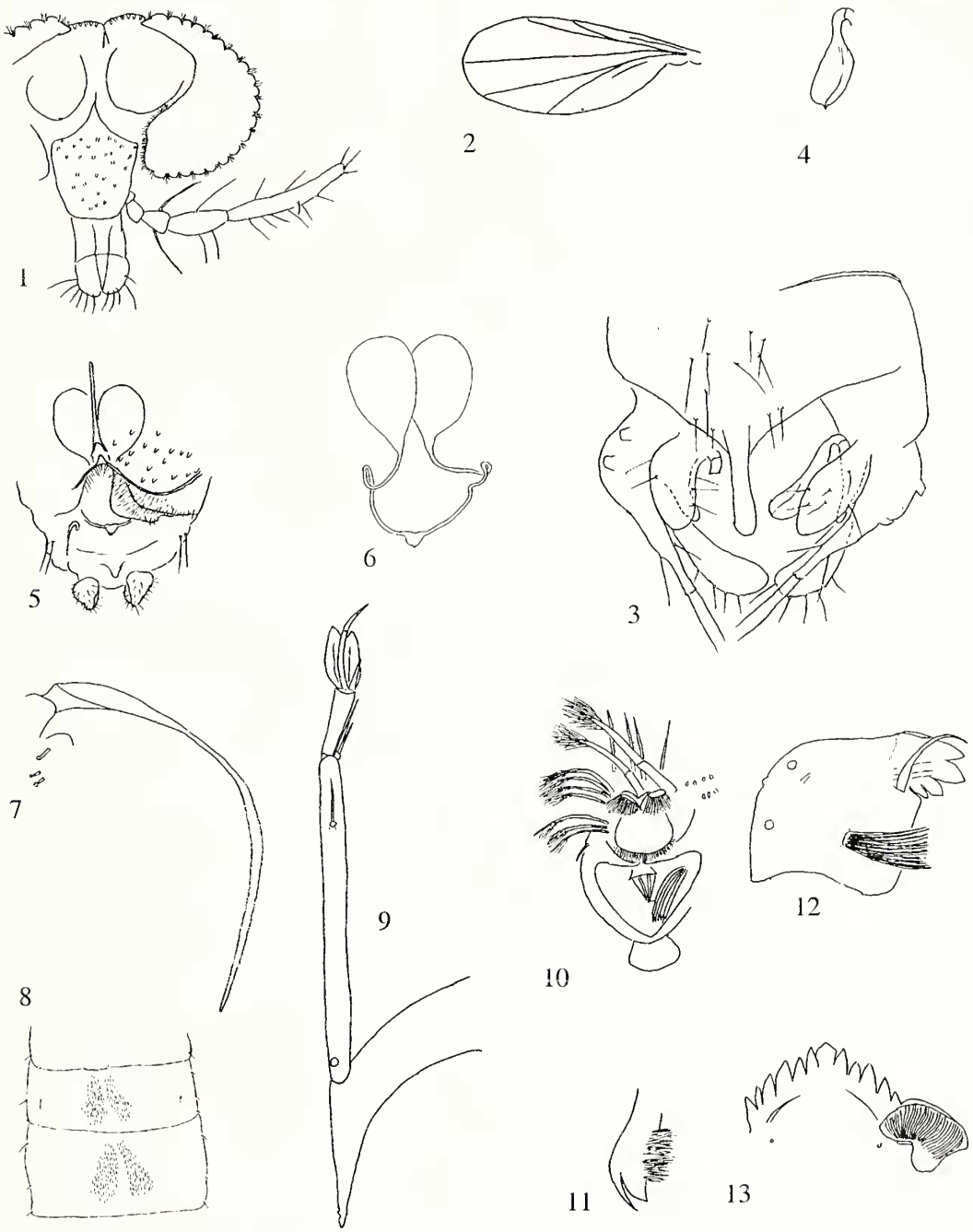
Mandible (Fig. 12): dorsal tooth light yellow, apical tooth and two inner teeth light brown; seta subdentalis long and curved, not extending beyond the apex; seta interna small and plumose; pecten mandibularis consisting of about 10 long lamellae.

Mentum (Fig. 13): all teeth light brown, median tooth rounded, six lateral teeth, second tooth shorter than the first tooth, then regularly decreasing in size; ventromental plates fan-shaped with anterior margin smooth and widely separated,

*Body*: anterior and posterior parapods with simple hooks; procercus broader than long with long anal and lateral setae.

SPECIMENS EXAMINED

All from Western Cape Province, South Africa, ♂, Molenaars River, 33° 43'S 19°10'E, 27 iv 96




**Figs 1–13**. *Afrozavrelia kribiensis*. **1-4**, adult male: 1, head; 2, wing; 3, hypopygium; 4, median volsella. **5-6**, adult female: 5, genitalia; 6, seminal capsules and ducts. 7-8, pupa: 7, thoracic horn and frontal setae; 8, abdominal tergites II–IV. **9-13**, larva: 9, antenna: 10, labrum; 11, premandible; 12, mandible; 13, mentum.

(cat. SAC.45R) (collector ADH) also 3 ♂♂, Eerste River, 33°56'S 19°10'E (Cat. E1Q2 24R, S2Q2 7M, S2Q2 10R) (collector Denise Schael, 1998); with 1 ♀ (Cat. RTDU.219), 2 pupae (Cat. RTDU. 282 with pharate ♂ and 148H with pharate ♀, cases contained larval remains, used for association), 3 larvae (Cat. RTDU, 294, 282 and 148H) (collector Rebecca Tharme, 1993-95). All material in AM.

NOTES

*Habitat Preferences*: The South African specimens were found in montane rivers with soft, unbuffered water. The larvae live in straight portable cases of diatoms and detritus and they appear to be detritivores or scrapers.

*Distribution*: Cameroon, Kribi; South Africa, Western Cape Province.

### *Rheotanytarsus shebelensis* sp. nov.

(Figs 14-17)

ADULT MALE (N = 3 mounted)

Close to the generic definition in Cranston et al. (1989) except for the structure of the medium volsella that has no plate.

*Body length*: 1.92 mm.

*Wing length*: 1.3 mm.

*Colour*: Head and antennae brown; thorax and legs brown, vittae, preepisternum and postnotum dark brown; abdomen brown with no obvious markings.

*Head*: AR 0.43-0.47; palp segments: 24-30, 27-30, 60-63, 78-81, 144-150 μm; no subapical sensillae on palp segment 3. Head setation: temporals 7, clypeals 15.

*Thorax*: no scutal tubercle; setation: lateral antepronotals nil, dorsocentrals 9, posterior prealars 1, scutellars 4 per side.

*Wings*: most of the surface covered with setae. $R_{2+3}$ absent. Setation of veins: R 22, $R_1$ 26-29, $R_{4+5}$ 50, seta also on other veins.

*Legs*: foretibia with short spur on scale; all combs with spurs. Leg measurements and ratios are given in Table 2.

*Hypopygium* (Figs 14, 15, 16, 17): anal tergite bands transverse or slightly V-shaped, not meeting; anal point without spine patches and downturned; superior volsella club-shaped without microtrichia (Fig. 14); median volsella (Fig. 16) with distal filamentous setae long extending beyond apex of inferior volsella, almost reaching the tip of the gonostylus, without median bend; distal setae narrow with no plate-like structure; inferior volsella normal, gonostylus tapering gradually. Figure 14 illustrates the Ethiopian specimen (the holotype) and Figs 15 & 16 a South African specimen with a narrower anal point and a somewhat smaller superior volsella. Some South African specimens have superior volsellae of intermediate size. Fig 17 illustrates the apodemes of the type.

SPECIMENS EXAMINED

1♂ found drowned, Wabe Shebele (river), Ethiopian Highlands, 07°01'N 39°03'E (ETC.34F) 1984.1.4, collector ADH (ZSM); 2 ♂♂ from light trap, Little Mooi River, KwaZulu-Natal, 29°13'S 29°53'E, (MOI 56CD & CH) and 2 ♂♂ from light trap, Kleinmooi River, KwaZulu-Natal, 29°13'S 29°53'E, 4.iv. 1995 (Cat. MOI. 65BT & CB), collectors F. C. de Moor and team (all in AM).

Holotype ♂ ETC. 34F; paratype ♂ MOI 65BT.

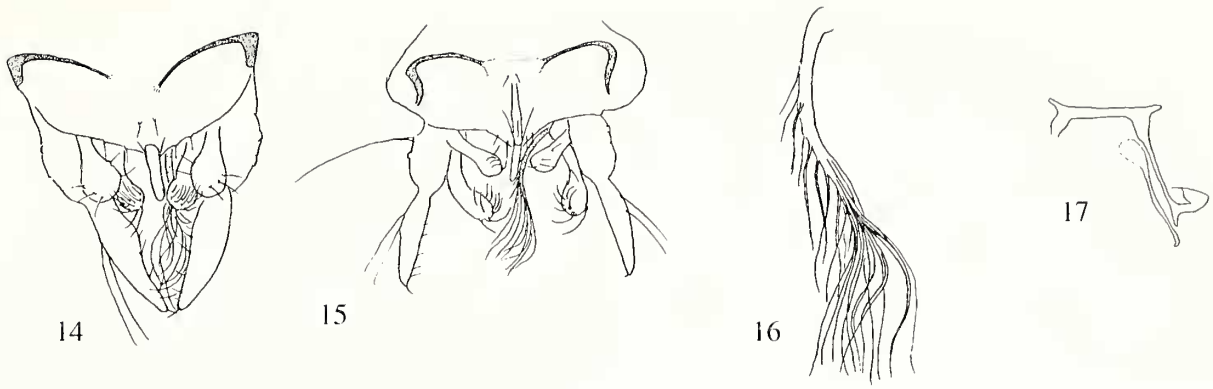
NOTES

This species falls into the *Rheotanytarsus pellucidus* group of Kyerematen et al. (2000) but it can be taken no further than couplet 3 of their key as it has filamentous not foliate setae on the median volsella. If this is neglected it would key out at couplet 5. It can be distinguished from the two species keyed there as follows: from *Rheotanytarsus pellucidus* (Walker) by not having the anal tergite bands clearly V-shaped, with the median volsella without

**Table 2.** *Rheotanytarsus shebelensis* leg measurements in μm and ratios

| | fe | ti | $ta_1$ | $ta_2$ | $ta_3$ | $ta_4$ | $ta_5$ | LR | BV | SV |
|---|---|---|---|---|---|---|---|---|---|---|
| $p_1$ | 528 | 288 | 588 | 324 | 240 | 168 | 98 | 2.0 | 1.7 | 1.4 |
| $p_2$ | 540 | 420 | 204 | 132 | 84 | 72 | 48 | 0.5 | 2.9 | 4.7 |
| $p_3$ | 600 | 504 | 300 | 204 | 168 | 120 | 72 | 0.6 | 2.5 | 3.7 |

Legend: fe = femur; ti= tibia; $ta_1$, $ta_2$, $ta_3$, $ta_4$, $ta_5$= tarsomeres 1-5; LR = leg ratio (length of tarsomere 1: length of tibia); BV = 'Beinverhältnisse' = combined length of femur, tibia and tarsomere 1 divided by length of tarsomeres 2 to 5; SV='Schenkel-Schiene Verhältnis' = ratio of femur plus tibia to tarsomere 1.




**Figs 14-17**. *Rheotanytarsus shebelensis*, adult male: 14, hypopygium (Ethiopian); 15, hypopygium (South African); 16, median volsella; 17, apodemes.

a median bend and lacking microtrichia on the superior volsella. It can be distinguished from *Rheotanytarsus buculicaudus* Kyerematen & Sæther by not having the anal tergite bands fused and with the gonostylus not abruptly but gradually narrowed (rather like that of *R. pellucidus*). In the key in Kyerematen and Sæther (2000) it keys to *R. buculicaudus* but differs from it as above.

*Etymology: shebelensis* referring to the Wabe Shebele (river) Ethiopian Highlands.

*Habitat preferences*: the larva has not yet been identified but it is assumed that, like most other members of the genus, it lives in the current in cases constructed for filter feeding. The adults were all collected drowned in or near rivers.

*Distribution*: Ethiopian Highlands and KwaZulu-Natal, South Africa.

### *Rheotanytarsus fuscus* Freeman

(Figs 18-20).

*Tanytarsus (Rheotanytarsus) fuscus* Freeman 1954

Also described in Freeman (1958) and Freeman & Cranston (1980).

The adult male is described by Freeman (1954 & 1958) and the adult male and pupa by Kyerematen & Sæther (2000) but the pupal specimen used by the latter authors lacked the thoracic horn. Scott (1967) described the distinctive characteristics of the pupa and larva and also gave a detailed account of the biology and behaviour of this species. Certain features of the pupa and larva have not yet been described and are added here.

PUPA (N = 2 mounted)

Scott (1967) illustrated the cephalothorax from the lateral and dorsal view; showing no frontal setae and none could be detected on the specimens examined here. In lateral view the cephalic horn is shown to be of the usual *Rheotanytarsus* type with a broad base and a down-turned distal section bearing small points. One long precorneal seta extends as far as the bend of the cephalic horn as shown in Fig. 18 (one of the mounted specimens), the other two being very short. Figure 19 shows details of the pupal anal spur on VIII. Otherwise these specimens conform to the descriptions of Kyerematen & Sæther (2000) and Scott (1967).

LARVA

(Numerous mounted and unmounted specimens).

*Body length*: 2-4 mm, depending on trophic conditions.

*Colour*: Scott notes: "In life the head is bright reddish brown and the abdomen greenish. In alcohol the head is brown and the abdomen yellowish white."

*Antenna*: as per Scott, Lauterborn organs reach base of segment 5.

*Labrum*: similar to *R. curtistylus* Goetghebuer. Illustrated by Pinder & Reiss (1983).

*Mandible*: as per Scott (1967), all teeth are dark.

*Mentum*: all teeth are dark, width of ventromental plate 0.95 x width of mentum.

*Maxilla* (Fig. 20): the lacinal chaetae are well-developed, there is no pecten galearis and there are two setae maxillaris.

*Body*: Scott (1967) illustrated the posterolateral bifid setae on segments III to VI. One branch lies anteriorly, the other posteriorly, both are plumose and are about as long as one third of the segment. These are best seen on unmounted specimens as the mounting medium may make them transparent and difficult to see. The anal setae are long and dark brown and the anal papillae are short with rounded tips.

SPECIMENS EXAMINED

1 pupa: Cecilia Ravine, Table Mountain, 33°60'S 18°25'E, i.98 (cat. ABLCR.7T), collector Denise Schael; larvae from small waterfall,

Silvermine River, 34°05'S 18° 25'E (cat. SAC. 37K) 24 ix 95, collector ADH (all in AM).

NOTES

*Habitat preference*: stony torrents.

*Distribution*: in permanent mountain streams in southern Africa.

### *Rheotanytarsus guineensis* Kieffer

(Figs 21-25)

*Rheotanytarsus guineensis* Kieffer, 1918

*Tanytarsus (Rheotanytarsus) guineensis* Freeman, 1958

Also described in Freeman & Cranston (1980) and Kyerematen & Sæther (2000).

The male hypopygium is described by Freeman (1958) and the hypopygium, female genitalia and pupa are described by Kyerematen & Sæther (2000). More details of the pupa and a description of the larva are given here. One larva was taken from a pupal case with pupa containing pharate male.

PUPA (N=2, mounted)

*Cephalothorax*: surface finely rugose, two minute pairs of dorsocentral setae, thoracic horn and precorneal setae as in Fig. 21, horn downturned, very transparent with minute small points on distal half, discernable under high power magnification; precorneal setae also very transparent, one long and two short.

*Abdomen*: paired spine patches on tergites II-IV, as per Keyermaten & Sæther; anal spur (Fig. 22) simple.

LARVA (N=6 mounted)

*Colour*: greenish in life; length *c*. 4 mm.

*Head capsule*: light brown; length 312 µm.

*Antenna* (Fig. 23): length 120 µm, AR 0.4; Lauterborn organs reach base of segment 5.

*Labrum*: similar to that of *R. curtistylus* Goetghebuer (Pinder & Reiss 1983).

*Mandible* (Fig. 24): all teeth dark brown, similar to the generic definition (Pinder & Reiss 1983) including the large seta interna consisting of four plumose branches.

*Mentum*: all teeth dark brown, width of ventromental plate 0.91 x width of mentum, specimen somewhat flattened on slide.

*Maxilla* (Fig 25): similar to that of *R. fuscus* but differing in small details such as the shape of the lacinal chaetae,

*Body*: claws of parapods all simple; procercal setae long and dark; anal tubules short with rounded tips. Bifid posterolateral setae are present on at least some of the middle segments. These are plumose but transparent and difficult to discern on mounted specimens.

SPECIMENS EXAMINED

Two mounted pupae and one larva from the confluence of the Mpisini and Manzamnyama Rivers near Lake Mzingazi, 32°09'S 28°42'E(Cat. MpMan. 8/96 (1)) viii 96, collector Petra Vos, (all in AM).

NOTES

*Habitat preference:* running water; tolerates slower flow than some other species of the genus.

*Distribution*: tropical and sub-tropical Africa.

### *Rheotanytarsus montanus* Lehmann

(Figs 26-33)

*Rheotanytarsus montanus* Lehmann, 1979

Also described in Kyerematen & Sæther (2000).

Lehmann (1979) described the adult male and the pupa; Kyerematen & Sæther (2000) described the adult male. The adults are dark brown to almost black flies, apparently more heavily chitinized and more compact than other African members of the genus. The species is found in upper mountain regions where streams are torrential. South African pupae and Ethiopian and South African larvae are described here.

PUPA (N = 4 mounted)

*Colour*: mostly colourless; abdominal spurs brown.

*Cephalothorax*: cephalic tubercles small with short frontal setae; thoracic horn (Fig. 26) long and slender, the distal, pointed third section more strongly chitinized than the rest and with a few small points; wing sheath with prominent nose; setae: two small antepronotals, three precorneals (Fig. 26), one much longer and darker than the other two; two pairs of small dorsocentrals, close together.

*Abdomen* (Fig. 27): no shagreen, tergites II-VI with anterior pair of point patches, very wide on II and III but width decreasing progressively so that those on V and VI are only as wide as long; patches of small spines just before and after hook row on tergite II; L setae very small or absent in some positions; three LS setae on V-VIII; fringe on anal lobe well developed; hook row on II small and undivided; pedes spurii A and B absent, but a few small transparent spines at the usual position of A on IV; posterolateral spur large with accessory points on ventral surface (Fig. 28).

LARVA (N = 16 mounted)

*Head capsule:* length 325 µm.

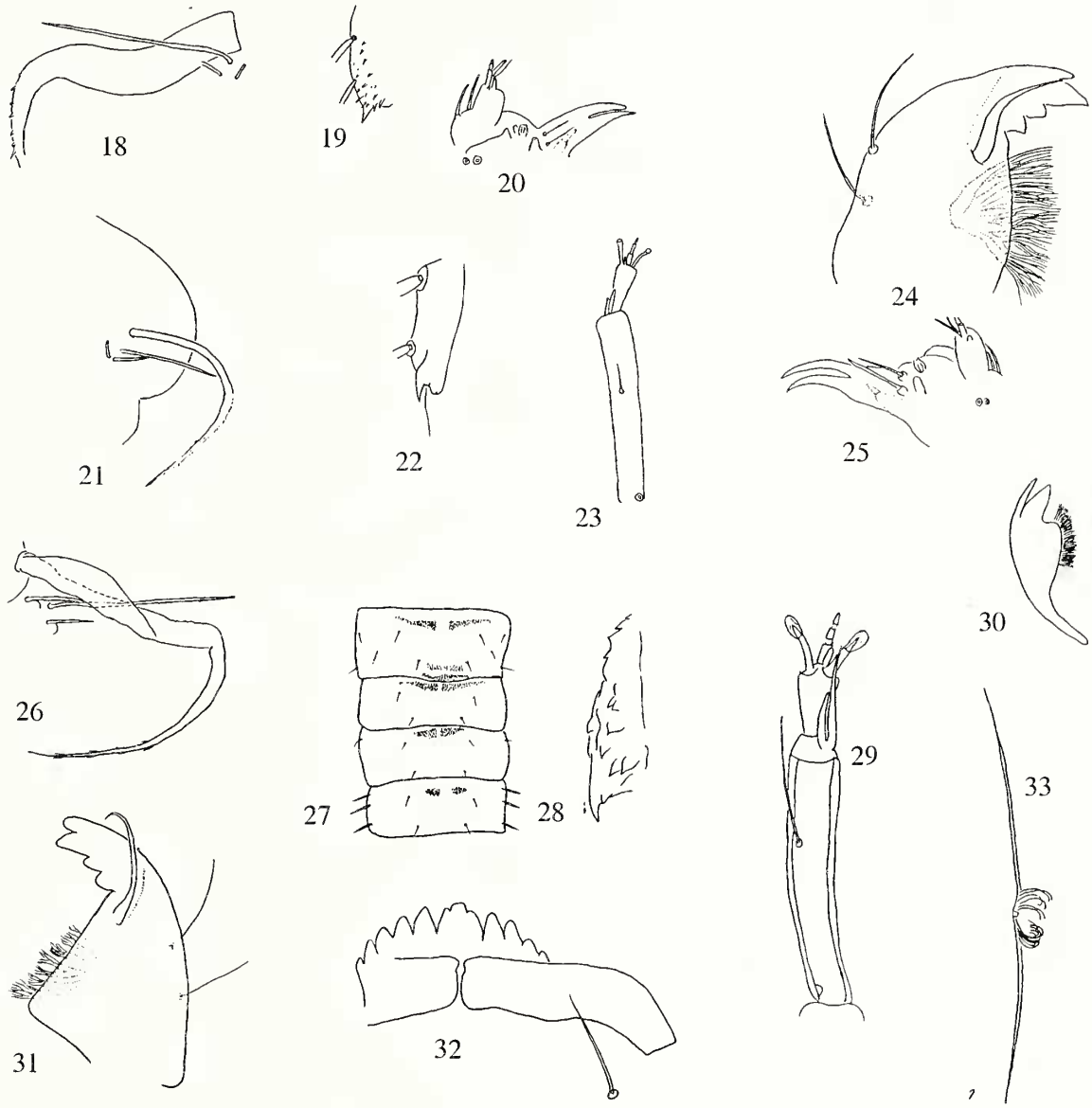
*Colour*: in fresh specimens the head and antennae glossy black, body greenish, claws light, and anal setae dark brown; in mounted specimens the head and antennae dark brown. Some South African specimens medium brown.

*Head*: dorsal surface, frontal apotome and labral

sclerites 1 and 2 all finely granular.
*Antenna* (Fig. 29): AR 2.6. Segment 2 very short, blade extends to tip of segment 3; Lauterborn organs prominent.
*Labrum*: similar to that of *R. curtistylus* Goetghebeur (Pinder & Reiss 1983). Premandible with two teeth and dense brush (Fig. 30).
*Mandible* (Fig. 31): all teeth brown, pecten mandibularis well-developed.
*Mentum* (Fig. 32): median tooth with lateral notches except in worn specimens, all teeth dark, width of ventromental plate the same as width of mentum.
*Maxilla*: very similar to that of *R. fuscus* (Fig. 20).
*Body*: apart from some simple setae, segments IV-VIII bear lateral setae with two main branches each bearing about six curved smaller branches (Fig. 33), in some cases the two main branches are adpressed so that the structure is not obvious; claws simple; anal tubules short with rounded tips.

SPECIMENS EXAMINED

Larvae from upper Kechene River, 09° 04'N 38°45'E (Ers. 6K), 13 ix 83; Danka River, 07°05'N 39°46'E (Ers. 34F), 20 i 84, collector ADH (in ZSM); South African specimens: from the Eastern Cape Province, one larva from KuKowa Stream, tributary of Slang-Mbashe River, (ECR 52) 7. xii 90; numerous larvae and four pupae from the Wildebees River near Glenelg, 31°13'S 28°04'E (ECR 112C 1 & 2) 26 iii 93; from KwaZulu-Natal, one larva from Bushmans River above Tugela confluence, 28°46'S 30°10'E (Bus 57Z (2) 05 x 2000. Collectors F.C. de Moor and team (in AM).




**Figs 18-33**. *Rheotanytarsus* spp.: **18-20**, *R. fuscus*. 18-19, pupa: 18, thoracic horn and frontal setae; 19, anal spur on VIII. 20, larva, maxilla. **21-25**, *R. guineensis*. 21-22, pupa: 21, thoracic horn and frontal setae; 22, anal spur on VIII. 23-25, larva: 23, antenna; 24, mandible; 25, maxilla. **26–33**, *R. montanus*. 26-28, pupa: 26, antenna and frontal setae; 27, tergites II-V; 28, anal spur on VIII. 29-33, larva: 29, antenna; 30, premandible; 31, mandible; 32, mentum; 33, lateral body seta.

NOTES

The South African pupa is very similar to that described by Lehmann (1979) notably in the wide point patches on tergites II & III.

*Habitat preferences*: the larvae were found among stones in very rapid currents in upper mountain streams; they seemed to be better adapted to faster currents than other species of *Rheotanytarsus*. The larval cases are similar to those of other species of the genus but the arm-like extensions of the cases, that support the silk strands, are comparatively much shorter.

*Distribution:* Ethiopian Highlands, the Kivu district mountains of the Congo (ex-Zaire) and KwaZulu-Natal and Eastern Cape Province (Drakensberg Mountains), South Africa.

### *Tanytarsus awashensis* sp. nov.

(Figs 34-37)

*Material examined*: this description is based on two drowned and damaged specimens.

ADULT MALE (N = 2 mounted)

Close to generic definition of Cranston et al. (1989).

*Wing length*: 0.98-1.17 mm.

*Colour*: head with palps and antennae light brown; thorax and legs light brown, vittae, preepisternum and postnotum brown, abdomen light brown with no obvious markings.

*Head*: AR 0.71-0.76; frontal tubercles about five times as long as the width of the base; palps (Fig. 34): 195 $\mu$m long; segments measuring 16, 31, 40, 46, 62 $\mu$m (rather short); two subapical sensillae on segment 3.

*Thorax*: no scutal tubercle; setation: lateral antepronotals nil, dorsocentrals 6, posterior prealars 1, scutellars 2 per side.

*Wings*: setae in the apical third of $r_{4+5}$ and $m_{1+2}$. Wings were in too poor a condition to determine the setation of veins.

*Legs*: scale of fore femur with long straight point; combs of other legs all with spurs. Tarsi were missing in the specimens, so are not described.

*Hypopygium* (Figs 35, 36 & 37): anal tergite bands almost transverse and not meeting; anal point with setae but no spine patches, downturned; superior volsella broad, almost square with short beak; digitus reduced; median volsellae short, brush-shaped and meeting centrally (Fig. 36); inferior volsella parallel- sided; apodemes as in Fig. 37.

SPECIMENS EXAMINED

2 ♂♂ found drowned in Lake Busata, a freshwater lake near Awash railway station, Ethiopia $8^0$05'N $40^0$ 30'E, xi 84, both the holotype and paratype on the slide ETC.67A (the holotype being the specimen near the label); collector ADH (in ZSM).

NOTES

*Habitat preference*: must have bred in the Lake Busata as there was no other water nearby.

*Distribution:* Ethiopian Rift Valley.

*General note on systematics: T. awashensis* is distinguished from all other known African species of *Tanytarsus* (Freeman 1958; Ekrem 2001) and all the Palaearctic species described by Reiss & Fittkau (1971), by the combination of anal point with no spine patches; almost square superior volsella with a short beak and reduced digitus and short, brush-shaped median volsellae that meet centrally. Segment 5 of the labial palps is short. Following the key in Ekrem (2001), *T awsahensis* reaches couplet 7 but differs markedly from the two species keyed there: from *T. pallidulus* Freeman in the shape of the superior volsella (not roughly oval) and its median volsella (not rounded) (Freeman 1958), and from *T. atrocincus* Goetghebuer, which has an L-shaped superior volsella, a distinctly rounded median volsella and an almost club-shaped inferior volsella (Freeman 1958).

*Etymology*: from the Awash River, Ethiopia.

### *Tanytarsus flumineus* sp. nov.

(Figs 38-43)

ADULT MALE (N= 4 mounted)

Close to generic definition of Cranston et al. (1989).

*Body length:* 2.7 mm.

*Wing length:* 1.8 mm.

*Colour*: whole body yellowish when preserved in alcohol

*Head*: AR 0.52-0.61; eyes with narrow dorsal extension; no frontal tubercles; head setation with seven verticals; palp segments measuring 30, 33, 96, 105, 192 $\mu$m, no subapical sensilla on segment 3.

*Thorax*: no scutal tubercle; setation: lateral antepronotals nil, dorsocentrals 9 uniserial, posterior prealars 1, scutellars 4 per side.

*Wings:* no anal lobe; membrane setae dense around wing tip from costa into $m_{3+4}$, sparser over most of the rest of the wing; vein seta: brachiolum 1, R 22, $R_1$ 36, $R_{4+5}$ 50, numerous on other veins.

*Legs:* tarsi are not described as most were missing from the material available; spur on foretibia short and curved. LR mid 0.7; sensilla chaetica on tarsomere 1, midleg 6.

*Hypopygium* (Figs 38, 39, 40, 41 & 42 ): anal tergite bands not meeting; few small median anal setae; anal point downturned with large crests with long spicules between (Fig. 39) with a few apical anal setae on either side; superior volsella short with at least 20 dorsal setae and a patch of microtrichia at lateral base; protruding digitus with no seta, but with a patch of microtrichia on its base (Fig. 40),

median volsella (Fig. 41) broad and long with short setae; apodemes as in Fig. 42.

ADULT FEMALE (n=1 mounted)

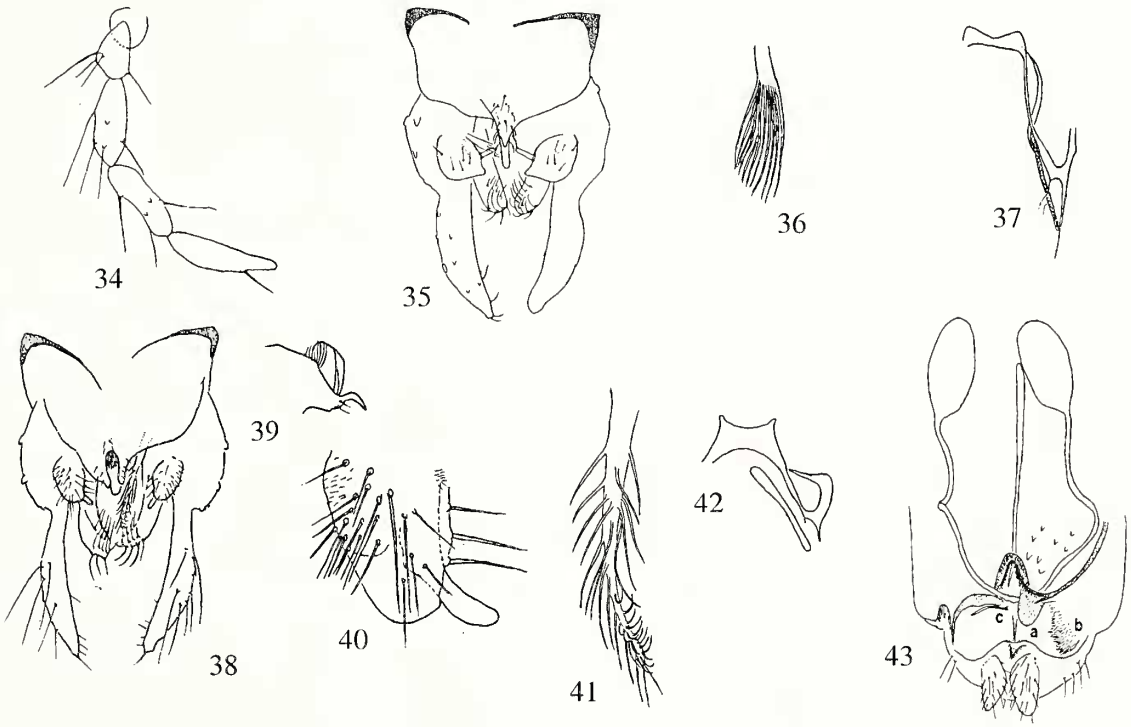
*Body length:* 2.0 mm.
*Wing length:* 1.4 mm.
*Colour*: similar to male.
*Head*: AR 0.3. No frontal tubercles, eyes like male. Setation: verticals 7. Palp segments 30, 36, 99, segments 4 and 5 missing. No subapical sensory sensilla on segment 3.
*Thorax:* setation: lateral antepronotals nil, dorsocentrals 11, posterior prealars 1, scutellars 2.
*Wings:* membrane setae similar to male. Vein setation: R 13, $R_1$ 28, $R_{4+5}$ 55.
*Legs*: fore tibia with scale and spur like male. All tarsi missing from the available specimen so not described here.
*Genitalia* (Fig. 43): S VIII forming a small floor under anterior part of the vagina; gonopophysis VIII divided into rounded dorsomesal lobe (Fig. 43a), large ventrolateral lobe (Fig. 43b) and small apodeme lobe (Fig. 43c); gonocoxapodemes narrow and light in colour and joined; coxosternapodemes broad and light in colour; notum long; gonocoxite IX closely applied to body with two to four setae; segment X without setae; postgenital plate triangular; cerci small (48$\mu$m); seminal capsules ovoid, large (63$\mu$m); seminal ducts with curves, central portion glandular, with common opening.

SPECIMENS EXAMINED

10 ♂♂ and 1 ♀ from Little Mooi River, KwaZulu-Natal, 29°13'S 29°53'E, 4. iv. 95, light trap (Cat. MOI 73AC, AD 1-4); (♂ holotype MOI 73 AD, ♂ paratype MOI 73 AD 3; ♀ paratype MOI 73 AD 4). 1 ♂ Bushmans River above waterfall, 28°46'S 30°10'E, 17 viii 99, (cat. BUS 48L (3)); collectors F.C. de Moor and team (in AM).

NOTES

Diagnostic features are the very large crests and long spicules between on the male hypopygium that distinguish this species from all other species in the genus described by Freeman (1958), Reiss & Fittkau (1971) and Ekrem (2001). This species does not fit in with features described in Ekrem's key apart from the main division in couplet 1 and the division in couplet 8 that leads to the group without a seta on the digitus. The female genitalia differ from those described for the genus by Sæther (1977) as the floor under the anterior part of the vagina is much smaller than he describes, also the species he examined had a simple gonopophysis VIII not divided into three parts as in this species. In discussing the genus he notes: "There are several sharp differences between the female genitalia of the species examined", so the female genitalia do seem to be very variable in this genus.
*Etymology*: *'flumineus'* Latin (Ovid) riverine.




**Figs 34-43**. *Tanytarsus* spp. **34-37**, *Tanytarsus awashensis,* adult male: 34, maxillary palp; 35, hypopygium; 36, median volsella; 37, apodemes. **38-43**, *Tanytarsus flumineus*. 38-42, adult male: 38, hypopygium; 39, anal point, lateral; 40, superior volsella; 41, median volsella; 42, apodemes. 43, adult female, genitalia.

*Habitat preferences*: the adults were caught alongside rivers so, presumably, the larvae lived there.
*Distribution*: known only from KwaZulu-Natal, South Africa.

### *Tanytarsus zimbabwensis* sp. nov.
(Figs 44-46)

(Note: the specimen was originally pinned).

ADULT MALE (N = 1 mounted)

Close to generic definition of Cranston et al. (1989).
*Body length:* 1.7 mm.
*Colour*: pinned specimen with head light brown, thorax light brown, vittae darker, abdomen yellowish.
*Wing length*: 1.2 mm.
*Head*: AR 1.0. Eyes with short parallel-sided dorsal extension; no frontal tubercles; palp segments damaged but appear to be normal for the genus.
*Thorax* setation: lateral antepronotals nil, dorsocentrals 10, posterior prealars 1, scutellars 2.
*Wings*: no anal lobe; setae on membrane: dense patches of setae at tips of $r_{4+5}$ and $m_{1+2}$ with an irregular row in the rest of these cells, dense patch of setae at tip of $m_{3+4}$ and a few in anal cell; vein setation: R 16, $R_1$ 12, $R_{4+5}$ 22, other veins all with setae.
*Legs*: mid and hind tibia each comb with a short straight spur. (Note: in the specimen examined the forelegs were missing and the other legs in poor condition).
*Hypopygium* (Figs 44, 45 & 46): anal tergite bands separate; seven anal tergite setae and three apical anal tergite setae per side; anal point with no central ridge, crests or spines, bare and rounded at the tip; superior volsella dog's-head shaped with long, protruding digitus; median volsella (Fig. 45) short with lamelliform setae; gonostylus small and narrow. The apodemes are illustrated in Fig. 46.

SPECIMEN EXAMINED

1 ♂ (holotype) bred out in laboratory from stream from granite dome Ngoma Kuriru, Chindomora, Zimbabwe, 17°35'S 31°10'E, 25. ii. 1964. (CCA.96C). Collector ADH (in AM).

NOTES

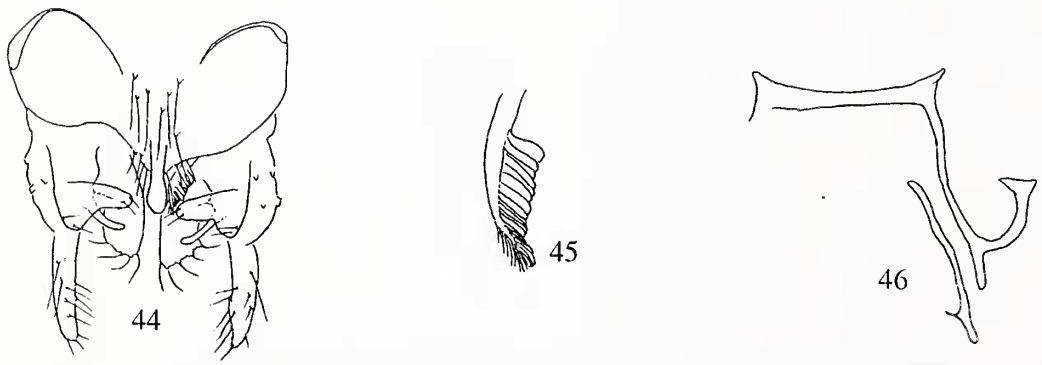
The following features are of diagnostic importance: the bare anal point with no central ridge, the dog's-head shaped superior volsella; the distinctive median volsella and the small and narrow gonostylus. These distinguish this species from those described in Freeman (1958), Reiss & Fittkau (1971) and Ekrem (2001). This species keys out to couplet 6 in Ekrem's key but the distinctive structures of the superior and media volsellae and the narrow gonostylus easily separate it from the species keyed there – *T. atomarius* Kieffer and *T. pallidissimus* Kieffer.
*Habitat Preferences*: the reared larvae were collected from stones in rapids in a small, swift-flowing stream.
*Distribution*: known only from Zimbabwe.

### *Virgatanytarsus aboensis* sp. nov.
(Figs 47-50)

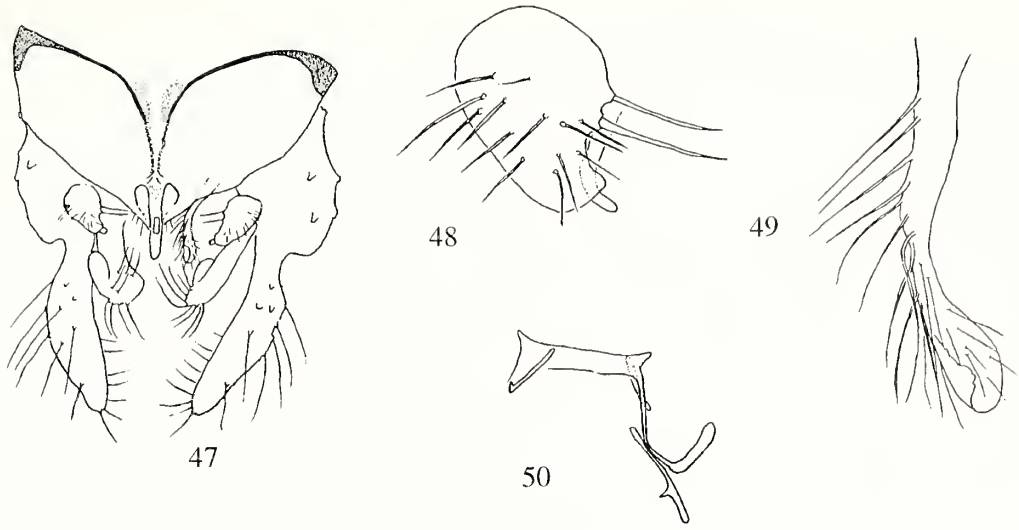
*Material examined*: this description is based on males from Ethiopia and one from Zimbabwe. Descriptions of the Zimbabwean specimen are given in brackets.

ADULT MALE (N = 11 mounted)

Close to generic definition of Cranston et al. (1989).
*Body length*. Ethiopia (N=9): 4.25-3.65 mm; Zimbabwe (N=2): 3.1 and 2.7 mm.
*Wing length*. Ethiopia (N=9): 2.9-2.5 mm; Zimbabwe (N=2): 2.0 and 1.9 mm.
*Colour:* head with antennae and palps brown; thorax brown, vittae, preepisternum and postnotum dark brown; wings with brownish tinge; legs brown; abdomen and hypopygium brown.
*Head:* AR 0.88-0.98 (0.90); frontal tubercles present; palp segments measuring 34, 53, 136, 140, 248 (34, 50, 124, 146, 248) μm; two subapical




**Figs 44-46**. *Tanytarsus zimbabwensis,* adult male: 44, hypopygium; 45, median volsella; 46, apodemes.




**Figs 47-50**. *Virgatanytarsus aboensis*, adult male: 47, hypopygium; 48, superior volsella; 49, median volsella; 50, apodemes.

sensillae on segment 3.

*Thorax*: no scutal tubercle; setation: lateral antepronotals nil, dorsocentrals 9-10, posterior prealars 1, scutellars 5 per side.

*Wings*: most of the wing extensively covered by setae, denser distally, but only present distally in cu and an. Setation of veins: brachiolum 1, R 28, $R_1$ 25, $R_{4+5}$ 25; other veins with setae except subcosta.

*Legs*: LR fore 2.3-2.6; mid 0.6; hind 0.64-0.74. Sensilla chaetica on tarsomere 1, on midleg 5-7, on hindleg nil. Table 3 shows leg measurements and ratios.

*Hypopygium* (Figs 47, 48, 49, 50): anal tergite bands separate but appear to continue posteriorly as darkly pigmented stripes that almost join just before the base of the anal point that has a short reflexed rod between the crests; superior volsella (Fig. 48) with at least 15 dorsal setae and digitus protruding in most specimens; median volsella (Fig. 49) with tip wide and flattened, edges tending to distort upwards, lamellae pointed; inferior volsella with a large, rather flat process (crista dorsalis?) without microtrichia, extending dorsomedially or dorsally. The apodemes are shown in Fig. 50, the pair of rods immediately ventral to the sternapodeme are present in all mounted specimens and may be part of the phallapodeme.

*Etymology*: *V. aboensis* from the Abo River in Addis Ababa and Ethiopia.

## SPECIMENS EXAMINED

1 ♂ Addis Ababa, Ethiopia, 09°00'N 38°47'E. (ETC.5J) xi. 82; 6 ♂♂ from Abo River, Addis Ababa, Ethiopia, 09°04'N 38°47'E (ETC. 42F & G) 8 ix 84, 1 (ETC.49H) v.85, 2 (ETC. 51M1 & M2) v.85, 1 (ETC. 60J) ix. 85, 1 (ETC. 61C) ix. 85; 1 ♂ from Kosso River Ethiopia, 09°43'N 39°39'E, (ETC. 26K) 12 i 84; 3 ♂♂ from Chindomora, Zimbabwe, 17°36'S 31°08'E (CCA. 24C & E, 96G) 10. ii.63 (collector ADH). All deposited in ZSM except CCA. 96G (that is in AM).

*Other material*: ♂♂ from Tugela Estates below Blauwkranz River confluence, upstream of Bushmans River, KwaZulu-Natal, 28°45'S 30°09'E (TUG127 AF6-10) 18 viii 99 (collectors F.C. de Moor and team). This material was in poor condition and was not used for description; deposited in AM. Holotype ♂ ETC. 51M1; paratype ♂ ETC. 42G.

**Table 3**: *Virgatanytarsus aboensis*, leg measurements in μm and ratios

| | | fe | ti | $ta_1$ | $ta_2$ | $ta_3$ | $ta_4$ | $ta_5$ | LR | BV | SV |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ethiopian specimen | $p_1$ | 750 | 500 | 1200 | 500 | 400 | 350 | 175 | 2.4 | 0.96 | 1.6 |
| | $p_2$ | 900 | 700 | 450 | 250 | 200 | 100 | 75 | 0.64 | 0.3 | 3.38 |
| | $p_3$ | 1050 | 950 | 600 | 350 | 300 | 250 | 50 | 0.63 | 0.3 | 2.6 |
| Zimbabwean specimen | $p_1$ | 550 | 450 | 1000 | 450 | 400 | 250 | 150 | 2.2 | 1.0 | 1.6 |
| | $p_2$ | 750 | 650 | 500 | 250 | 175 | 100 | 75 | 0.58 | 0.26 | 3.0 |
| | $p_3$ | 850 | 850 | 625 | 350 | 300 | 200 | 75 | 0.74 | 0.37 | 2.5 |

LEGEND: fe = femur; ti= tibia; $ta_1$, $ta_2$, $ta_3$, $ta_4$, $ta_5$= tarsomeres 1-5; LR = leg ratio (length of tarsomere 1: length of tibia); BV = 'Beinverhältnisse' = combined length of femur, tibia and tarsomere 1 divided by length of tarsomeres 2 to 5; SV='Schenkel-Schiene Verhältnis' = ratio of femur plus tibia to tarsomere 1.

NOTES

*Differential diagnosis*: anal point with short reflexed rod between crests, inferior volsella with a large flat process, without microtrichia, extending dorsomedially or dorsally. Only two further species were known previously from sub-Saharan Africa: *Virgatanytarsus arduensis* Goetghebuer and *V. nigricornis* Goetghebuer. The first is widespread in the tropics and the second in the tropics south to Kwa-Zulu-Natal. *V. aboensis* is easily distinguished from these by the shape of the inferior volsella.

The specimens from Zimbabwe came from a pristine mountain stream running off a large granite inselberg and the Ethiopian specimens came from a mountain stream immediately above Addis Ababa that was somewhat organically enriched; this could account for the larger specimens from that stream. The KwaZulu-Natal specimens were drowned in the river and unsuitable for measurements.

*Habitat Preferences*: this species appears to breed in mountain streams, even in stony runs.

*Distribution*: Ethiopian Highlands, Zimbabwe and KwaZulu-Natal.

## ACKNOWLEDGEMENTS

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